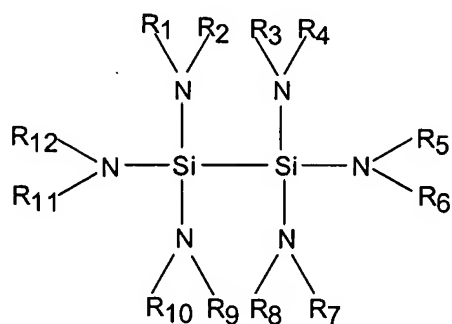


## THE CLAIMS

### What is claimed is:

1. A silicon compound comprising a disilane derivative that is fully substituted with alkylamino and/or dialkylamino functional groups.
2. The silicon compound of claim 1, characterized by two or more alkylamino and/or dialkylamino functional groups symmetrically distributed in relation to the Si-Si bond.
3. The silicon compound of claim 1, characterized by two or more alkylamino functional groups symmetrically distributed in relation to the Si-Si bond.
4. The silicon compound of claim 1, characterized by two or more dialkylamino functional groups symmetrically distributed in relation to the Si-Si bond.
5. The silicon compound of claim 1, characterized by a melting temperature of less than 100°C.
6. The silicon compound of claim 1, characterized by a vaporization temperature of less than 300°C.
7. A silicon compound having the formula:

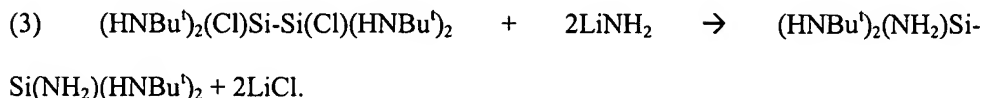
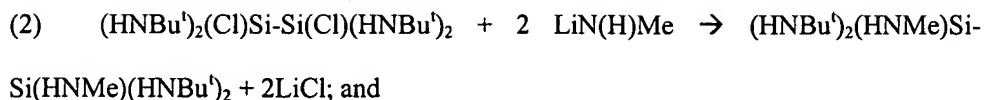


wherein:

R<sub>1</sub>-R<sub>12</sub> may be the same as or different from one another and each is independently selected from the group consisting of H, C<sub>1</sub>-C<sub>5</sub> alkyl, and C<sub>3</sub>-C<sub>6</sub> cycloalkyl.

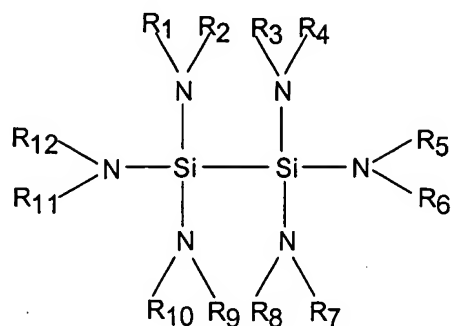
8. The silicon compound of claim 7, characterized by two or more alkylamino and/or dialkylamino functional groups symmetrically distributed in relation to the Si-Si bond.
9. The silicon compound of claim 7, characterized by two or more alkylamino functional groups symmetrically distributed in relation to the Si-Si bond.
10. The silicon compound of claim 7, characterized by two or more dialkylamino functional groups symmetrically distributed in relation to the Si-Si bond.
11. The silicon compound of claim 7, characterized by a melting temperature of less than 100°C.
12. The silicon compound of claim 7, characterized by a vaporization temperature of less than 300°C.
13. A silicon compound selected from the group consisting of (NEt<sub>2</sub>)<sub>2</sub>(HNMe)Si-Si(HNMe)(NEt<sub>2</sub>)<sub>2</sub>, (HNBu<sup>t</sup>)<sub>2</sub>(HNMe)Si-Si(HNMe)(HNBu<sup>t</sup>)<sub>2</sub>, and (HNBu<sup>t</sup>)<sub>2</sub>(NH<sub>2</sub>)Si-Si(NH<sub>2</sub>)(HNBu<sup>t</sup>)<sub>2</sub>.
14. A method for forming a silicon compound as in claim 13, comprising one of the following reactions:
 

(1) (NEt<sub>2</sub>)<sub>2</sub>(Cl)Si-Si(Cl)(NEt<sub>2</sub>)<sub>2</sub> + excess H<sub>2</sub>NMe → (NEt<sub>2</sub>)<sub>2</sub>(HNMe)Si-Si(HNMe)(NEt<sub>2</sub>)<sub>2</sub> + 2H<sub>2</sub>NMe·HCl;



15. A method of forming a silicon-containing film on a substrate, comprising contacting a substrate under chemical vapor deposition conditions with a vapor of a silicon compound as in claim 1.
16. A method of forming a silicon-containing film on a substrate, comprising contacting a substrate under chemical vapor deposition conditions with a vapor of a silicon compound as in claim 7.
17. A method of forming a silicon-containing film on a substrate, comprising contacting a substrate under chemical vapor deposition conditions with a vapor of a silicon compound as in claim 13.
18. A composition for chemical vapor deposition of a silicon-containing film on a substrate, said composition comprising (i) one or more disilane derivatives that are fully substituted with alkylamino and/or dialkylamino functional groups and (ii) one or more hydrocarbon solvents.
19. The composition of claim 18, wherein said hydrocarbon solvents comprise  $\text{HN}^i\text{Pr}_2$ .
20. The composition of claim 18, comprising at least two disilane derivatives.
21. A composition for chemical vapor deposition of a silicon-containing film on a substrate, said composition comprising:

- (a) one or more silicon compounds having the formula:



wherein:

$R_1$ - $R_{12}$  may be the same as or different from one another and each is independently selected from the group consisting of H,  $C_1$ - $C_5$  alkyl, and  $C_3$ - $C_6$  cycloalkyl; and

- (b) one or more hydrocarbon solvents.
22. The composition of claim 21, wherein said hydrocarbon solvents comprise  $HN^iPr_2$ .
23. The composition of claim 21, comprising at least two disilane derivatives.
24. A method of forming a silicon-containing film on a substrate, comprising the steps of:
- providing a composition as in claim 18;
  - vaporizing said composition to form a precursor vapor; and
  - contacting the substrate under chemical vapor deposition conditions with said precursor vapor to form said silicon-containing film.
25. The method of claim 24, wherein said composition is vaporized at a temperature that is not higher than 300°C.
26. The method of claim 24, wherein said composition is vaporized at a temperature that is not higher than 150°C.

27. The method of claim 24, wherein said silicon-containing film comprises silicon nitride.
28. A method of forming a silicon-containing film on a substrate, comprising the steps of:
  - (a) providing a composition as in claim 21;
  - (b) vaporizing said composition to form a precursor vapor; and
  - (c) contacting the substrate under chemical vapor deposition conditions with said precursor vapor to form said silicon-containing film.
29. The method of claim 28, wherein said composition is vaporized at a temperature that is not higher than 300°C.
30. The method of claim 28, wherein said composition is vaporized at a temperature that is not higher than 150°C.
31. The method of claim 28, wherein said silicon-containing film comprises silicon nitride.